CITY COUNCIL
ATLANTA, GEORGIA

An Ordinance By: Clair Muller

02-O-1592

AMENDING THE 2002 (2001 WATER AND WASTEWATER BOND COSTRUCTION FUND) BUDGET IN THE AMOUNT OF TWO MILLION EIGHT HUNDRED TWELVE THOUSAND EIGHT HUNDRED FIFTY DOLLARS ($2,812,850) FOR A WATER QUALITY AND WATER QUANTITY LONG-TERM MONITORING NETWORK TO INSTALL WATER MONITORING EQUIPMENT; AND FOR OTHER PURPOSES.

WHEREAS, the City of Atlanta desires to launch the construction portion of this long term monitoring program as part of an intergovernmental agreement with United States Geological Survey (USGS); and

WHEREAS, the construction phase of the project will install five (5) real time water quality and discharge monitoring stations; install two (2) discharge only monitoring stations; fund operation and maintenance for twelve (12) months of ten (10) real time water quality and discharge monitoring stations and two (2) discharge only monitoring stations; sample twelve (12) events at all twenty (20) stations; sample storm events at ten (10) stations during ten (10) storms and sample low flow synoptic at up to forty (40) sites; and

WHEREAS, funding for this project is available in the 2001 Water and Wastewater Bond Fund.

NOW, THEREFORE BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF ATLANTA; as follows:

SECTION 1: That the 2002 (2001 Water and Wastewater Bond Fund) Budget be amended as follows:

TRANSFER FROM APPROPRIATIONS

2J27 724001 M24I22029999	Facilities Evaluation	$ 2,812,850.00
	Total	$ 2,812,850.00

TRANSFER TO APPROPRIATIONS

2J27 773001 M24I22029999	Facilities Other Than Building	$2,332,230.00
2J27 775001 M24I22029999	Equipment	391,200.00
2J27 775002 M24I22029999	Motorized Equipment	89,420.00
	Total	$2,812,850.00

SECTION 2: That all ordinances or parts of ordinances in conflict herewith be, and the same are hereby repealed.

A true copy,
Rhonda Dauphin Johnson
Municipal Clerk, CMC

ADOPTED by the Council SEP 16, 2002
APPROVED by the Mayor SEP 24, 2002

Form 9-1366
(May 1996)

U.S. Department of the Interior
U.S. Geological Survey
Joint Funding Agreement
FOR
WATER RESOURCES INVESTIGATIONS

THIS AGREEMENT is entered into as of the **2nd** day of **April** 2002 by the U.S. GEOLOGICAL SURVEY, UNITED STATES DEPARTMENT OF THE INTERIOR, party of the first part, and the **City of Atlanta,** party of the second part.

1. The parties hereto agree that subject to the availability of appropriations and in accordance with their respective authorities there shall be maintained in cooperation **a water quality and quantity monitoring network as described in the attached proposal titled "A Water-Quality Monitoring Network for the City of Atlanta, GA, Revised 4/02/ 2002," and letter dated April 2, 2002,** hereinafter called the program.
2. The following amounts shall be contributed to cover all of the cost of the necessary field and analytical work directly related to this program.

   (a) **$50,000** by the party of the first part during the period **June 1, 2002** to **December 31, 2003**

   (b) **$2,812,850** by the party of the second part during the period **June 1, 2002** to **December 31, 2003**

   (c) Additional or reduced amounts by each party during the above period or succeeding periods as may be determined by mutual agreement and set forth in an exchange of letters between the parties.
3. The costs of this program may be paid by either party in conformity with the laws and regulations respectively governing each party.
4. The field and analytical work pertaining to this program shall be under the direction of or subject to periodic review by an authorized representative of the party of the first part.
5. The areas to be included in the program shall be determined by mutual agreement between the parties hereto or their authorized representatives. The methods employed in the field and office shall be those adopted by the party of the first part to insure the required standards of accuracy subject to modification by mutual agreement.
6. During the course of this program, all field and analytical work of either party pertaining to this program shall be open to the inspection of the other party, and if the work is not being carried on in a mutually satisfactory manner, either party may terminate this agreement upon 60 days written notice to the other party.
7. The original records resulting from this program will be deposited in the office of origin of those records. Upon request, copies of the original records will be provided to the office of the other party.
8. The maps, records or reports resulting from this program shall be made available to the public as promptly as possible. The maps, records or reports normally will be published by the party of the first part. However, the party of the second part reserves the right to publish the results of this program and, if already published by the party of the first part shall, upon request, be furnished by the party of the first part, at cost, impressions suitable for purposes of reproduction similar to that for which the original copy was prepared. The maps, records or reports published by either party shall contain a statement of the cooperative relations between the parties.
9. Billing for this agreement will be rendered **quarterly**. Payments of bills are due within 60 days after the billing date. If not paid by the due date, interest will be charged at the current Treasury rate for each 30 day period, or portion thereof, that the payment is delayed beyond the due date. (31 USC 3717; Comptroller General File B-212222, August 23, 1983.).

U.S. GEOLOGICAL SURVEY
UNITED STATES
DEPARTMENT OF THE INTERIOR

By, Brian E. McCallum
(SIGNATURE & TITLE)
DISTRICT CHIEF

CITY OF ATLANTA - SEE REVERSE SIDE

By _____

By _____

By _____

(USE REVERSE SIDE IF ADDITIONAL SIGNATURES ARE REQUIRED)

ATTEST:

Municipal Clerk

City of Atlanta

Mayor (seal)

ATTEST:

Corporate Secretary

USGS

Brian E. McCall

for District Chief

APPROVED:

Commissioner of Public Works

APPROVED:

Chief Operating Officer

APPROVED AS TO FORM:

City Attorney

APPROVED:

Director, Bureau of
Purchasing and Real Estate

APPROVED:

Chief Financial Officer

Form 9-1366
(May 1996)

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U.S. GEOLOGICAL SURVEY
UNITED STATES
DEPARTMENT OF THE INTERIOR

By Brian E. McCall
(SIGNATURE & TITLE)
for DISTRICT CHIEF

CITY OF ATLANTA - SEE REVERSE SIDE

By _____

By _____

By _____

(USE REVERSE SIDE IF ADDITIONAL SIGNATURES ARE REQUIRED)

ATTEST:

_____
Municipal Clerk

City of Atlanta

_____
Mayor (seal)

ATTEST:

_____
Corporate Secretary

USGS

Brian E. McCall
for District Chief

APPROVED:

_____
Commissioner of Public Works

APPROVED:

_____
Chief Operating Officer

APPROVED AS TO FORM:

_____
City Attorney

APPROVED:

_____
Director, Bureau of
Purchasing and Real Estate

APPROVED:

_____
Chief Financial Officer

PROPOSAL FOR A WATER-QUALITY MONITORING NETWORK FOR THE CITY OF ATLANTA, GA

Submitted by the U.S. Geological Survey (USGS) to the City of Atlanta via

CH_2M Hill, Incorporated

Federal Interest Statement

An important part of the U.S. Geological Survey's (USGS) mission is to provide scientific information to assist in the management of the water resources of the Nation. To effectively assess the Nation's surface-water resources, the USGS operates more than 7,000 streamgaging stations, monitors lakes and reservoirs, makes periodic flow measurements on rivers and streams using standardized methods, and maintains the data from these stations in a national data base. The data are made available on the World Wide Web (WWW) and are published annually for each State. Substantial amounts of data also are available on the WWW, on a near real-time basis, to cooperators, customers, and the public; this is important for effective management of the Nation's water resources. Surface-water data on stage/discharge are used by various entities planning and managing diverse water-resources projects and programs. These programs include, but are not limited to: flood warnings; flood assessments; reservoir operations; water-quality monitoring, establishing water-quality standards; designing infrastructure (e.g., bridges, culverts, dams); evaluating the effects of changing land use; detecting long-term climate change; and administering compacts, decrees, and/or treaties on interstate and international water bodies. The stream gaging, and lake and reservoir monitoring stations operated in Georgia are an integral part of the USGS nationwide surface-water data program.

To assess the quality of the Nation's surface and ground water resources, the USGS collects data from rivers, lakes, estuaries, and aquifers. Water-quality data are published in annual data reports and an increasing amount of real-time and historical water-quality data are available on the WWW. This information, collected using standardized instruments and procedures, contributes to a nationally consistent data base for assessing water quality. Long-term data-collection programs characterize the

physical, chemical, and biological changes in water resources in response to natural processes (e.g., climatic variations, storms, floods, droughts, volcanic eruptions) as well as to anthropogenic activities. The data are useful in designing programs to protect watersheds, sensitive aquatic habitats, biota, and drinking water sources from urban and agricultural runoff, sewage, and industrial and mining wastes. The data also are useful in designing programs to maintain waterways for other beneficial uses such as navigation, aesthetics, contact recreation, and to meet national and international treaty obligations. The water-quality data collected in Georgia are an integral part of the USGS nationwide water-quality data program.

Project Objectives

(1) Assess baseline conditions.

(2) Identify sources of impairment.

(3) Document stream improvement in response to capital improvements.

(4) Consolidate water-quality program requirements.

(5) Provide public education on water quality issues.

(6) Recommend/design changes based on the results of the monitoring program.

(7) Provide data and interpretations to facilitate remediation, if required.

Project Approach

The City of Atlanta (COA) encompasses an area of approximately 134 mi^2 (341 km^2). It includes the headwaters for several streams (tributaries to Peachtree, Utoy, and Proctor Creeks) that drain to the Chattahoochee River, as well as streams (e.g., Intrenchment, Federal Prison, and Poole Creeks) that drain to the South River, and ultimately, into the Ocmulgee/Altamaha Rivers. Generally, the greatest amount of urbanization (generation of large amounts of impervious surface) is in the more upstream areas. Numerous studies have demonstrated that large population centers, along with their associated infrastructure and industrial activity, exert a significant effect on water quality. This accrues as a result of the presence of impervious surfaces as well as the discharge of numerous chemical constituents (e.g., trace elements, nutrients, sediment, organic compounds). The combination of urbanization and excessive point and non-point

discharges is expected to produce deleterious effects on water quality. The proposed project is intended to create both a water quality and quantity monitoring network in the COA area that will establish current and ongoing water-quality constituent levels, permit the calculation of annual constituent fluxes (loads), and facilitate the management of the major watersheds in the COA. Further, this network is intended to evaluate the efficacy of significant capital improvements that are being made to the COA's water-treatment facilities.

In brief, the program design entails long-term monitoring at twenty (20) fixed sites and a one-time high- and low-flow synoptic sampling program at up to forty (40) additional sites. Ten (10) real-time continuous water-quality and quantity streamflow stations will be installed on the major streams traversing the COA [Peachtree (3), Nancy (2), Proctor (1), Utoy (2), and Intrenchement (1) Creeks and South River (1); see Table 1). These stations will collect and record continuous data on discharge, conductivity, temperature, pH, dissolved oxygen (DO), rainfall, and turbidity. Site locations generally will remain within the COA, but will be as far downstream as practicable to better quantify the export of a variety of chemical constituents. To improve the collection efficiency of event samples/measurements, automatic samplers will be installed at all ten (10) real-time continuous water-quality and quantity streamflow stations to augment the real-time water-quality data probes. These ten (10) sites will be phased into operation during the first few months of the project [within 45 days of final equipment delivery].

In addition, continuous stage/discharge monitors will be installed at two (2) other sites (Proctor and Sandy Creeks, see Table 1) to facilitate the determination of discharge and the movement of water and associated chemical constituents throughout the COA watersheds. Lastly, eight (8) additional, uninstrumented long-term water-quality and quantity sites will be established at key locations throughout the COA watersheds (see Table 1). These additional sites will be selected to help produce a comprehensive picture of the movement of water and chemical constituents throughout the COA watersheds. Possible resiting for these eight (8) uninstrumented long-term monitoring sites may occur based on the results from the high- and low-flow synoptic sampling programs (see later).

Representative water column samples will be collected at all twenty (20) sites, on a hydrologically based schedule, and analyzed for a variety of water-quality parameters.

Table 1: Long-Term Station Locations for the City of Atlanta Monitoring Program	
Station Identifier	**Location**
Real-Time Water-Quality and Discharge Stations	
PEA-2	Peachtree Creek at Northside Drive
PEA-4	North Fork Peachtree Creek at Buford Highway
PEA-5	South Fork Peachtree Creek at Johnson Road
NAN-1	Nancy Creek at West Wesley Road
NAN-3	Nancy Creek at Rickenbacker Drive
UTO-1	Utoy Creek at Great Southwest Parkway
UTO-3	Utoy Creek at Peyton Road
PRO-1	Proctor Creek at Jackson Parkway
INT-1	Intrenchment Creek at Constitution Road
SOU-1	South River at Forrest Park Road
Real-Time Discharge Stations	
SAN-1	Sandy Creek at Bolton Road
PRO-2	Proctor Creek at Hortense Road
Long-Term Water-Quality Monitoring Sites	
PEA-1	Peachtree Creek at Bohler Road
PEA-3	Peachtree Creek at Piedmont Road
SOU-2	South River at Macon Drive
SOU-3	South River Tributary at Springdale Road
PRO-3	Proctor Creek Tributary at Spring Road
NAN-2	Nancy Creek at Randall Mill Road
UTO-2	Utoy Creek at Childress Road
LUL-1	Lullwater Creek at Lullwater Parkway

Discharge may be measured at the time of sampling. These samples will be used to: (1) establish low- and high-flow water-quality baseline (prior to capital improvements) conditions; (2) calibrate the water-quality probes, (3) calibrate the automatic samplers; and (4) calibrate non-representative grab/point samples at the ten (10) sites which are not fitted with automatic samplers. The samples collected at the twenty (20) long-term monitoring sites will be distributed throughout the year in an attempt to cover at least 80% to 85% of normal annual discharge conditions. The samples will be analyzed for various constituents including trace elements, nutrients, suspended sediment concentration, sewage tracers, bacteria, and other selected constituents.

Sample collection and subsequent analyses will be used for calibrating the real-time water-quality monitoring probes and automatic samplers at the ten (10) real-time monitoring sites, and the grab/point samples at the other ten (10) long-term monitoring sites, against representative cross-sectional samples. This will be done in an attempt to establish relations between the discrete measurements/samples and the continuous water-quality monitoring data or grab/point samples, with the expectation that eventually, discrete representative depth- and width-integrated sampling could be scaled back.

Ideally, the discrete hydrologically-based samples will be replaced by real-time water-quality monitoring surrogates and non-representative grab/point samples. If no usable relations can be established with the real-time measurements (e.g., turbidity, DO, conductivity), then at a minimum, the ten (10) automatic samplers and ten (10) grab samples will be calibrated to reflect representative cross-sectional concentrations. Experience has indicated that it will take between twenty (20) and thirty (30) paired data points, collected over a range of typical flow conditions (80 – 85% of a typical annual hydrograph) to develop the requisite relations. Once these surrogates/relations have been finalized, discrete representative depth- and width-integrated sampling will be limited to ensuring the continued utility/validity of the surrogates/relations.

Finally, during the first nineteen (19) months of the monitoring program, two (2) major synoptic sampling programs will be conducted, one during low flow and one during high flow. The rationale for the dual synoptics is based on the fact that water-quality conditions are hydrologically linked. During low-flow periods, point sources exhibit maximum influence, whereas during high flow periods nonpoint sources exhibit

maximum influence on water-quality conditions. Data from both synoptics may be used to relocate the eight (8) uninstrumented long-term monitoring sites. Further, these synoptics should provide a consistent basinwide framework for utilizing and understanding the long-term continuous monitoring data collected from all twenty (20) monitoring sites. Finally, these synoptic studies also are intended to identify relatively localized sources of impairment. Such areas may require subsequent evaluative sampling and/or monitoring that are not covered by the current budget.

Storm/event sampling is a major issue in urban water-quality studies. This accrues because significant short-term changes in chemical and suspended sediment concentrations typically occur during rainstorms. Hence it is important to track these changes to: (1) estimate the fluxes and concentrations of the various constituents; (2) determine the uncertainty in the flux estimates generated from the relations between constituent concentration and a continuously measured surrogate (e.g., turbidity, conductivity, discharge); (3) identify potential contaminant sources (typically nonpoint), and (4) evaluate the real-time performance of the water-quality probes by comparing the probe-generated data with that from the adjacent automatically collected samples. Further, stormflow may account for the majority of annual chemical (dissolved, sediment-associated) and suspended sediment transport. In extreme cases, some 90% of the annual transport can occur during as little as 10% of the time.

Storm sampling experience from other USGS programs in the Atlanta area indicate that precipitation driven stormflow typically occurs outside of normal working hours, with the highest magnitude thunderstorms occurring during the evening or night. To limit manpower costs, and to ensure adequate sample coverage of these events, automatic samplers will be used *in lieu* of manually collected samples. However, automatic samplers, like the real-time water-quality probes, only are capable of collecting non-representative point samples. Hence, the data from the automatically collected samples must be corrected in the same way as the probe data. This will be accomplished using appropriate corrections determined from the analyses of the 'monthly' (hydrologically-based) representative depth- and width-integrated and non-representative grab/point samples.

Work Elements

I. Fixed Sites

A: Fully Instrumented Sites (10): Sites will be selected, at locations to be determined by consensus between the COA, CH_2M Hill, and the USGS, on each of the six (6) major streams draining the COA (Peachtree, Nancy, Proctor, Utoy and Intrenchment Creeks, and South River). These sites will be located at their most practical downstream point and will be fully instrumented (itemized equipment costs and vendors are listed in Appendix A) with the following:

(1) Stage sensor

(2) Satellite telemetry (for connection with real time data collection platform; supplied by USGS) and a land-line or cell phone (for connection with the automatic sampler and related data collection platform; supplied by COA)

(3) Continuous water-quality probes

(a) Conductivity

(b) pH

(c) Temperature

(d) Dissolved oxygen (DO)

(e) Turbidity

(4) Rain gage

(5) Refrigerated automatic sampler (AC power supplied by COA)

USGS personnel routinely will measure discharge [at least six (6) times per year concurrently with sample collection and augmented with high-flow measurements] at each site until a stage-discharge relation has been well established. This relation will be used to convert real-time stage measurements to discharge data. The time to develop a site-specific stage-discharge relation usually takes about one year. This assumes that all ten (10) sites have a standard stage-discharge relation, with no backwater, or other unusual hydrologic factors to complicate the computations.

Continuous water-quality data at the ten (10) real-time stations will be collected using *in situ* probes. Each probe will be checked using a pre-calibrated field probe during each site visit. In an attempt to develop a correlation between sediment concentration and turbidity, monthly depth- and width integrated suspended sediment samples will be

collected and analyzed for each site by USGS personnel. Current technological limitations for the collection of continuous pH, turbidity, and dissolved oxygen data require weekly site inspections; any requisite cleaning or calibration will take place during these visits. Seasonally, site-specific analyses also will be performed for all network stations to ensure that each cross-section is homogeneous, and that the *in situ* probes are functioning adequately.

Weekly, USGS field personnel will analyze all the continuous data, and apply any necessary corrections (e.g., deleting outliers, editing data; correcting for variable shifts in the real-time data and/or the stage/discharge relation). The data will be stored in the USGS National Water Information System (NWIS) data base, which will be linked to the Georgia District WWW StormWatch page for real-time data display. These data will be permanently archived as a matter of public record. On an annual basis, all the data will be checked and reviewed by qualified USGS hydrologists in preparation for publication. The USGS also will perform an external review at least once every three years, to ensure national consistency through the use of approved techniques and protocols.

Real-time data will be either publicly accessible, or cooperator limited, through the USGS NWISWeb Internet website, which will automatically display all parameters collected and transmitted from each continuous monitoring site. Additionally, two copies of a GIS-based software package, that permits the spatial display of water-quality/water-quantity data, will be provided one each to the City of Atlanta and CH_2M Hill, so that all Georgia real-time data can be viewed in a GIS-based display. This software package is standard to all USGS cooperators to provide a redundant means of accessing real-time data. USGS personnel will install the client software packages on networked desktop PC's, one provided by the City of Atlanta and one by CH_2M Hill. Discrete water-quality data will be uploaded every quarter to the USGS NWISWeb Internet website. More frequent retrievals can be made, upon request.

All data also will be published annually in a CD-ROM based report entitled "Water Resources for Georgia, Water Year xxxx". This CD-ROM report is a GIS-based product that incorporates maps, photos, and GIS coverages to help place hydrologic data in a spatial context.

The automatic sampling equipment will require 120-volt AC power, which will be provided by the COA. The remote operation of the automatic samplers requires either a cell or land-based telephone connection, which will be provided by the COA. The telephone line also will be used for real-time data transmission when the COA assumes responsibility for the operation and maintenance of the real-time monitoring network.

Year One Cost Summary

Installation: $507,300

Labor: $62,100

Equipment: $356,200

Construction: $89,000

Operation & Maintenance: $245,000

Labor, Vehicles, and Supplies [5 units for 7 months (6/02-12/02) and 5 units for 4 months (9/02-12/02)]:$245,000

COST 03/01/02 – 12/31/02: $752,300

Year Two Cost Summary

Operation & Maintenance: $546,000

Labor, Vehicles, and Supplies (12 months):$546,000

COST 1/1/03 – 12/31/03: $546,000

B: Continuous Discharge Sites: At two (2) additional sites, to be determined by consensus between the COA, CH_2M Hill, and the USGS, typical continuous discharge stations will be established. Equipment will include (itemized equipment costs and vendors are listed in Appendix A):

(1) Stage sensor

(2) Satellite telemetry

(3) Data logger

(4) Rain gage

USGS personnel routinely will measure discharge at each site so that a stage-discharge relation can be established. This relation will be used to convert real-time stage to discharge data. The time to develop a site-specific stage-discharge relation usually takes about one year. This assumes that the two (2) sites have a standard stage-

discharge relation, with no backwater or other unusual hydrologic factors, to complicate the computations.

On a weekly basis, USGS field personnel will analyze all the continuous data, and apply any necessary corrections (e.g., correcting for variable shifts in the stage/discharge relation). The data will be stored in the USGS National Water Information System (NWIS) database, which will be linked to the Georgia District WWW StormWatch page for real-time data display. These data will be permanently archived as a matter of public record. On an annual basis, all the data will be checked and reviewed by qualified USGS hydrologists in preparation for publication. The USGS also will perform an external review at least once every three years, to ensure national consistency through the use of approved techniques and protocols.

Year One Cost Summary

Installation: $68,700

Labor: $13,700

Equipment: $35,000

Construction: $20,000

Operation & Maintenance: $7,200

Labor, Vehicles, and Supplies [4 months (9/02-12/02): $7,200

COST 03/01/02 – 12/31/02: $75.900

Year Two Cost Summary

Operation & Maintenance: $22,000

Labor, Vehicles, and Supplies (12 months): $22,000

COST 1/1/03 – 12/331/03: $22,000

C: Periodic Water-Quality Sampling and Hydrologic Measurements at Fixed Sites: At twenty (20) sites [the same twelve (12) sites described in A and B above, and at an additional eight (8) sites to be selected by consensus] periodic hydrologically-based water-quality sampling will be performed at an average rate of one (1) per month. In addition, discharge measurements will be made at the eight (8) ungaged sites.

All sampling will be performed following the USGS parts per billion (ppb) clean protocol. USGS representative Equal Width Increment/Equal Discharge Increment (EWI/EDI) samples will be collected concurrently with non-representative point samples from the automatic samplers and measurements from the water-quality probes at the ten (10) fully-instrumented sites, and with grab samples from the ten (10) other sites, in an attempt to develop appropriate correction factors for the point samples/measurements, to facilitate long-term data comparability and to reduce the future need for the collection of representative depth- and width-integrated samples. Although twelve (12) samples/year will be collected at all twenty (20) sites, the sampling schedule will be modified to better encompass hydrologic variability and will include 10% additional sampling and analyses for QA/QC purposes. USGS Georgia District Office personnel will analyze the samples for many of the constituents. Bacterial analyses will be performed in the USGS Georgia District Office by contractor-supplied personnel (Southeast Water). The USGS National Water-Quality Laboratory (NWQL), Denver, Colorado will analyze sample aliquots for sewage tracers and dissolved trace elements.

The periodic samples will be analyzed for a variety of water-quality constituents (see Appendix B for analytes listed by category and costs) including:

(1) Dissolved trace elements (Appendix B1)

(2) Suspended trace elements (Appendix B4)

(3) Nutrients (Appendix B2, B4))

(4) Bacteria (Appendix B3)

(5) Sewage tracers (Appendix B6)

There are specific rationales for the selection of these parameters.

Trace elements [e.g., Ag, Pb, Zn, Cu, Cd, Hg, (Appendix B1, B4)] typically are associated with point- and non-point source urban and stormwater runoff including treated wastewater, and have been identified as a cause for stream reach impairment in COA basins. For example, Ag is associated with photography and has been found in treated wastewater. Cu, Pb, and Zn are associated with plumbing and plumbing fixtures. Further, Zn comes from automobile tires and from asphalt shingle roof runoff where it is used as an algaecide and to prevent mildew.

Nutrients [e.g., nitrogen, phosphorus, and carbon compounds; Appendix B2, B4)] typically are associated with point- and nonpoint source urban and stormwater runoff including treated and untreated sewage. These constituents can derive from the break-down of organic waste (e.g., lawn clippings, kitchen waste) as well as from fertilizer applications on residential and commercial sites. Excess nutrient loadings can lead to eutrophication in downstream impoundments and to problems with dissolved oxygen levels.

Bacteria [fecal coliform, *E.* coli; Appendix B3)] typically are associated with point- and nonpoint-source urban and stormwater runoff including treated wastewater, as well as leaking sanitary sewer lines and septic systems. Bacteria have been identified as a cause for stream reach impairment in a number COA basins. Lastly, bacteria have been used for a number of years as surrogates for human pathogens; as such, excess levels can indicate a potential human health hazard.

Suspended sediment (Appendix B4), in excess, represents a major physical cause of impaired stream reaches in COA basins. In addition, suspended sediment represents a significant carrier for a wide variety of chemical constituents including trace elements, nutrients, and persistent hydrophobic organic compounds.

Sewage tracers (Appendix B6) typically are associated with treated wastewater as well as with leaking sanitary sewer lines and septic systems. This group of constituents is far more indicative of these types of inputs than bacteria, which can be extremely high in point- and nonpoint-source urban and stormwater runoff.

Year One Cost Summary

Labor [7 months (6/02-12/02)]: $61,250

Vehicles/Supplies [7 months (6/02-12/02)]: $21,700

Analytical (Representative Samples): $198,040

(Appendix B1) Dis. T.E. (140): $23,100

(Appendix B4) Sus. T.E.(140):$79,100

(Appendix B2) Majors and Nutrients (140):$21,700

(Appendix B3) Bacteria (140): $4,340

(Appendix B6) Sewage Tracers (140): $51,800

Quality Control (7 months): $18,000

Analytical (Point Samples): $141,240

(Appendix B1) Dis. T.E. (140): $23,100

(Appendix B4) Sus. T.E.(140): $79,100

(Appendix B2) Majors and Nutrients (140): $21,700

(Appendix B3) Bacteria (1400): $4,340

Quality Control (7 months): $13,000

COST 03/01/02 – 12/31/02: $422,230

Year Two Cost Summary

Labor (12 months): $108,120

Vehicles/Supplies (12 months): $38,280

Analytical (Representative Samples): $344,740

(Appendix B1) Dis. T.E. (240): $40,800

(Appendix B4) Sus. T.E.(240):$139,200

(Appendix B2) Majors and Nutrients (240):$38,400

(Appendix B3) Bacteria (240): $3,840

(Appendix B6) Sewage Tracers (240): $91,200

Quality Control (24): $31,300

Analytical (Point Samples): $248,680

(Appendix B1) Dis. T.E. (240): $40,800

(Appendix B4) Sus. T.E.(240): $139,200

(Appendix B2) Majors and Nutrients (240): $38,400

(Appendix B3) Bacteria (240): $7,680

Quality Control (24): $22,600

COST 1/1/03 – 12/31/03: $739,820

D: Storm/Event Sampling: At each of the ten (10) long-term real-time sites equipped with automatic samplers, storm/event samples (six (6) samples per storm/event) will be collected for four (4) storms during the first year and ten (10) storms during the second year. All the samples from each storm/event will be analyzed for a partial suite of chemical constituents; a subset of these will be analyzed for all constituents.

The typical procedure for sampling stormflow is to oversample. The automatic samplers are controlled by dataloggers, and triggered by real-time, *in situ*, conditions at each site. The number of samples collected per storm will vary depending on the storm's characteristics, but on average, each storm can be charaterized by six (6) samples [one (1) sample at the onset of the storm to represent pre-event conditions, three (3) samples during the hydrographic rise, and two (2) samples during the hydrographic recession].

A subset of the samples will be selected for chemical analysis based on the real-time characteristics of the streamwater (i.e., discharge, turbidity, conductance and temperature). It is expected that fourteen (14) stormflows will be sampled during the nineteen months, and all streamwater samples from the four (4) rainstorms in the first year and the ten (10) rainstorms in year 2 will be analyzed for real-time water-quality related parameters (pH, conductivity, and SSC). A further subset of these samples [two (2) rainstorms at six (6) samples per rainstorm at ten (10) sites in year one and four (4) in year two (2)] will be analyzed for major ions, nutrients, bacteria, and sewage tracers. The samples from four of the additional rainstorms also will be analyzed for nutrients. The samples from one (1) of these rainstorms (preferably the largest) also will be analyzed for suspended sediment-associated and dissolved trace elements in each year and in year 2, samples from two additional rainstorms, which are analyzed for major ions, nutrients, bacteria, and sewage tracers, also will be analyzed for suspended sediment-associated elements. Suspended sediment concentration (SSC) will be determined on all samples. However because it is determined as part of the suspended sediment trace element analysis, only sixty (60, 18 in year 1 and 42 in year 2) SSC-only analyses per site are listed as a separate analytical cost. Likewise, the major ion and nutrient analysis includes the determination of pH and conductivity and for some samples the nutrients are analyzed but the major ions are not.

Refrigeration is required to maintain sample integrity for the subsequent analysis of nutrients and bacteria. This will require 120-volt AC power that will be supplied by the COA.

As noted above, the storm/event samples will be analyzed for a variety of water-quality constituents (see Appendix B for analytes listed by category and costs) including:

(1) Dissolved trace elements (Appendix B1)

(2) Suspended trace elements (Appendix B4)

(3) Majors and nutrients (Appendix B2, B4))

(4) Conductivity , pH, and nutrients

(5) Suspended sediment concentration (TSS) concentration

(6) Bacteria (Appendix B3)

(7) Sewage tracers (Appendix B6)

Year One Cost Summary

Labor: $17,500

Vehicles/Supplies: $6,200

Analytical (Automated storm Samples): $122,880

(Appendix B1) Dis. T.E. (60): $9,900

(Appendix B4) Sus. T.E.(60):$33,900

(Appendix B2) Majors and Nutrients (120):$18,600

Conductivity and pH (240): $6,000

Nutrients (0): $0

Suspended Sediment Concentration (SSC) (180): $4,680

(Appendix B3) Bacteria (120): $3,720

(Appendix B6) Sewage Tracers (120): $44,400

Quality Control (variable): $7,680

COST 03/01/02 – 12/31/02: $146,580

Year Two Cost Summary

Labor: $54,060

Vehicles/Supplies: $19,140

Analytical (Automated storm Samples): $272,800

(Appendix B1) Dis. T.E. (60): $10,200

(Appendix B4) Sus. T.E.(180):$104,400

(Appendix B2) Majors and Nutrients (80):$30,600

Conductivity and pH (600): $15,600

Nutrients (240): $18,480

Suspended Sediment Concentration (SSC) (420): $11,340

(Appendix B3) Bacteria (180): $5,760

(Appendix B6) Sewage Tracers (180): $68,400

Quality Control (variable): $26,500

COST 01/01/03 – 12/31/03: $346,000

II. Synoptic Sampling

A: Late in the first year or early in the second year (Dec. 2002 – Mar. 2003) during the wet season, a high-flow synoptic sampling and analysis program will be performed over a period of approximately two weeks (weather permitting). During the high-flow synoptic, only water column samples will be collected from approximately forty (40) sites, selected by consensus, throughout the COA watersheds.

All sampling will be performed following the USGS parts per billion (ppb) clean protocol. USGS representative Equal Width Increment/Equal Discharge Increment (EWI/EDI) samples will be collected at all forty (40) sites. USGS Georgia District Office personnel will analyze these samples for many of the constituents. Bacterial analyses will be performed in the USGS Georgia District Office by contractor-supplied personnel (Southeast Water). The USGS National Water-Quality Laboratory (NWQL), Denver, Colorado will analyze sample aliquots for sewage tracers and dissolved trace elements.

The synoptic samples will be analyzed for a variety of water-quality constituents (see Appendix B for analytes listed by category and costs) including:

(1) Dissolved trace elements (Appendix B1)

(2) Suspended trace elements (Appendix B4)

(3) Nutrients (Appendix B2, B4))

(4) Bacteria (Appendix B3)

(5) Sewage tracers (Appendix B6)

Year One Cost Summary

Labor: $18,500

Vehicles/Supplies: $4,100

Analytical (Representative Samples): $56,540

(Appendix B1) Dis. T.E. (40): $6,600

(Appendix B4) Sus. T.E.(40):$22,600

(Appendix B2) Majors and Nutrients (40):$6,200

(Appendix B3) Bacteria (40): $1,240

(Appendix B6) Sewage Tracers (40): $14,800

Quality Control (4): $5,100

COST 03/1/02 – 12/31/02: $79,140

B: During the early part of the first year (June 2002 – Nov. 2002) or the mid-to-late part of the second year (May 2003 – Nov. 2003) during the dry season, a low-flow synoptic sampling and analysis program will be performed over a period of approximately two weeks (weather permitting). During the low-flow synoptic, both water column and bed sediment samples will be collected from approximately forty (40) sites, selected by consensus throughout the COA watersheds (see map). Water column samples will be analyzed for various dissolved (filtered-water) parameters including: trace elements, major ions, nutrients, sewage tracers, and bacteria. The surface (upper 1 to 2 cm) bed sediment samples will be used as surrogates for suspended sediment, as such they will be pre-screened at 63-µm. The <63-µm bed sediment aliquots also will be analyzed for a variety of water-quality parameters including: trace elements and nutrients.

All sampling will be performed following the USGS parts per billion (ppb) clean protocol. USGS representative Equal Width Increment/Equal Discharge Increment (EWI/EDI) water samples will be collected at all forty (40) sites. USGS Georgia District Office personnel will analyze these samples for many of the constituents. Bacterial analyses will be performed in the USGS Georgia District Office by contractor-supplied personnel (Southeast Water). The USGS National Water-Quality Laboratory (NWQL), Denver, Colorado will analyze sample aliquots for sewage tracers and dissolved trace elements.

The synoptic samples will be analyzed for a variety of water-quality constituents (see Appendix B for analytes listed by category and costs) including:

(1) Dissolved trace elements (Appendix B1);

(2) Bed sediment trace elements (Appendix B5);

(3) Nutrients (Appendix B5, B4);

(4) Bacteria (Appendix B3)

(5) Sewage tracers (Appendix B6)

Year Two Cost Summary

Labor: $11,500

Vehicles/Supplies: $4,100

Analytical (Representative Samples): $58,580

(Appendix B1) Dis. T.E. (40): $6,800

(Appendix B5) Bed sediment. T.E.(40):$23,200

(Appendix B2) Majors and nutrients (40):$6,800

(Appendix B3) Bacteria (40): $1,280

(Appendix B6) Sewage tracers (40): $15,200

Quality Control (4): $5,300

COST 1/1/03 – 12/31/03: $74,180

USGS Role in Proposal

The USGS proposes to procure all the equipment needed for the installation of the ten (10) real-time water-quantity and quality/automatic sampler monitoring stations and the two (2) continuous stage/discharge stations; oversee and coordinate the construction of shelters and stilling wells for equipment protection at each site; survey the elevation at each site to establish an accurate water elevation; set up real-time data displays both at the NWISWeb Internet site and in the client's database software; and perform routine maintenance of the monitoring stations. Further, the USGS will supply and pay for the satellite telemetry for five (5) of the real-time continuous water-quality and quantity sites ($48,400) established during the first year (3/1/02–12/31/02) of the project. In addition, during the second year of the project (1/1/03–12/31/03) the USGS will contribute $50,000 [$25,000 (10/02-9/030 plus $25,000 (10-03-12/03] toward the cost of the program. USGS personnel also will collect and analyze all water-quality samples at each of the twenty (20) sites, on an approximately monthly basis. The USGS routinely will monitor the quality of the real-time data, in accordance with the Georgia District Office's approved quality assurance plan. Additionally, the USGS will publish all collected hydrologic information in its annual CD-ROM data report.

City of Atlanta Role in Proposal

The City agrees to assist with benchmark locations within the City boundaries and, if necessary, to grant permission to install monitoring stations on/at city-owned locations. Further, the City will be responsible for providing lines carrying 120V A.C. power and phone lines to all ten (10) real-time water quality and quantity sites instrumented with automatic samplers, phone lines to the two (2) continuous discharge sites, and for actual power and phone usage. Also, the City will be responsible for the cost of replacement of any inoperable equipment. The City will be responsible for providing a PC with a Windows operating system, MS Office 2000, and Internet connection to have access to StormWatch software displays. Finally, the City will be responsible for paying all installation, operation and maintenance, sampling, and analytical costs associated with this project.

Appendix A

Equipment, Installation, Operation, and Maintenance Costs

Appendix B

Analytical Parameters and Associated Costs

(B1): Trace Elements in Water ($165/170)

aluminum
cadmium
chromium
copper
lead
manganese
nickel
silver
zinc
pH, laboratory
specific conductance, laboratory

(B2): Major Ions and Nutrients in Water ($155/160)

Nitrogen, ammonia
Nitrogen, ammonia and organic nitrogen
Nitrogen, nitrite
Nitrogen, nitrate
Phosphorus, orthophosphate
Dissolved phosphorus
Total phosphorus
Sulfate
Chloride
Bromide
Fluoride
Sodium
Calcium
Magnesium
Potassium
Iron
Manganese
Strontium
Barium
Silica
Alkalinity (gram titration)
pH, laboratory
specific conductance, laboratory

(B3): Bacteria ($31/32)

Fecal coliform
E. coli

(B4): Trace Elements in Suspended Sediments ($565/580)

suspended sediment concentration
silver
copper
lead
zinc
cadmium
chromium
cobalt
nickel
barium
vanadium
lithium
beryllium
molybdenum
strontium
arsenic
antimony
selenium
mercury
iron
manganese
aluminum
titanium
total phosphorus
total nitrogen
total carbon
total organic carbon

(B5): Trace Elements in Bed Sediments ($565/580)

moisture content
sand/silt split (sieving at 63-μm)
silver
copper
lead
zinc
cadmium
chromium
cobalt
nickel
barium
vanadium
lithium
beryllium
molybdenum
strontium
arsenic
antimony
selenium
mercury
iron
manganese
aluminum
titanium
total phosphorus
total nitrogen
total carbon
total organic carbon

(B6): Sewage Tracers in Water ($370/380)

1,4-Dichlorobenzene
1-Methylnaphthalene
17-beta-Estradiol
2,6-Dimethylnaphthalene
2-Methylnaphthalene
3-beta-Coprostanol
3-Methyl-1(H)-indole (Skatole)
3-tert-Butyl-4-hydroxy anisole (BHA)
4-Cumylphenol
4-n-Octylphenol
4-tert-Octylphenol
5-Methyl-1H-benzotriazole
Acetophenone
Acetyl hexamethyl
tetrahydronaphthalene (AHTN)
Anthracene
Anthraquinone
Benzo[a]pyrene
Benzophenone
beta-Sitosterol
beta-Stigmastanol
Bisphenol A
Bisphenol A, d3 (surrogate)
Bromacil
Bromoform
Caffeine
Caffeine-C13 (surrogate)
Camphor
Carbaryl
Carbazole
Chlorpyrifos
Cholesterol
Cotinine
d-Limonene
Decafluorobiphenyl (surrogate)
Diazinon
Dichlorvos
Equilenin
Estrone
Ethynyl estradiol
Fluoranthene
Fluoranthene, d10 (surrogate)
Hexadydrohexamethylcyclopentabenzop
yran (HHCB)
Indole
Isoborneol
Isophorone
Isopropylbenzene
Isoquinoline
Menthol
Metalaxyl
Methyl salicylate
Metolachlor
N,N-diethyl-meta-toluamide (DEET)
Naphthalene
Nonylphenol, diethoxy- (total)
Octylphenol, diethoxy-
Octylphenol, monoethoxy-
p-Cresol
para-Nonylphenol (total)
Pentachlorophenol
Phenanthrene
Phenol
Prometon
Pyrene
Tetrachloroethylene
Tri(2-butoxyethyl)phosphate
Tri(2-chloroethyl)phosphate
Tributyl phosphate
Triclosan
Triethyl citrate (ethyl citrate)
Triphenyl phosphate
Tris(dichlorisopropyl)phosphate

Appendix C

Budget Summaries

PROJECT: Atlanta Real-Time Hydrologic Monitoring Network
OPERATOR: City of Atlanta
PURPOSE: To real-time monitor water quality parameters in the metro Atlanta basins
PLAN: Install 10 real-time SW/QW monitor/auto sampler sites
REVISED 03-19-02

INSTALL 10 REAL-TIME STREAMFLOW, CONTINUOUS QW, AND AUTOMATIC SAMPLING SITES

INSTRUMENTATION

	Part #		Unit Cost	Quantity	SUBTOTAL	TOTAL	TOTAL (w/OH)
Vaisala							
555A DCP	555A	$1,702.59	$1,532.33	11	$16,855.64		
Internal mounting plate	555-7038	$81.37	$73.23	11	$805.56		
GOES radio (100/300 baud)	555-7031	$2,060.00	$1,854.00	12	$22,248.00		
Incremental encoder	436BD-2	$955.84	$860.26	1	$860.26		
Encoder cable	555-3029	$138.02	$124.22	1	$124.22		
Float wheel assembly	436-7001	$264.71	$238.24	1	$238.24		
Antenna	443A	$439.81	$395.83	11	$4,354.12		
Antenna cable	530-3507	$177.16	$159.44	11	$1,753.88		
VENDOR SUBTOTAL						$47,239.92	$55,576.38
Applied Power							
Solar Panel (20-watt)			$258.00	12	$3,096.00		
Regulator			$52.00	12	$624.00		
VENDOR SUBTOTAL						$3,720.00	$4,376.47
Power Sonic							
Battery			$103.00	12	$1,236.00		
VENDOR SUBTOTAL						$1,236.00	$1,454.12
Design Analysis							
Non submersible pressure transducer	H350/355 XL		$3,760.00	11	$41,360.00		
SDI-12 Raingage, 0.01 inch tipping bucket	H340-SDI		$613.00	11	$6,743.00		
VENDOR SUBTOTAL						$48,103.00	$56,591.76
YSI							
Multi-sonde	6820		$3,198.15	16	$51,170.40		
Field Cable (100')	6093		$185.40	12	$2,224.80		
SDI-12 flying leads cable	6096		$68.60	12	$823.18		
DO probe	6562		$463.50	24	$11,124.00		
Turbidity probe	6026		$1,242.18	24	$29,812.32		
ph probe	6561		$185.40	24	$4,449.60		
Calibration cable	6067B		$157.59	2	$315.18		
ltiparameter display systems (high memory, barometer)	650		$2,317.50	2	$4,635.00		
VENDOR SUBTOTAL						$104,554.48	$123,005.27
ISCO							
Automatic Sampler, SDI-12, refrigerated	6712 FR		$5,350.85	12	$64,210.20		
Stage sensor, to trigger sampler	bubbler		$1,848.85	12	$22,186.20		
Bottle configuration	1 x 15L		$92.70	12	$1,112.40		
Suction Line	100 ft		$128.75	12	$1,545.00		
VENDOR SUBTOTAL						$89,053.80	$104,769.18
DELL							
laptop		1	$1,850.00	4	$7,400.00	$7,400.00	$8,705.88
DIAD							
StormWatch licenses (one-time cost for client software)		1	$750.00	2	$1,500.00	$1,500.00	$1,764.71
	Instrumentation subtotal				**$356,243.76**		

CONSTRUCTION

rials

Aluminum angle (for gage house structure)	1	$103.00	9	$927.00		
Gage house (DCP and sampler)	1	$4,120.00	9	$37,080.00		
Gage house (DCP only)	1	$515.00	0	$0.00		
Raingage mount (vandal proof)	1	$206.00	9	$1,854.00		
6" PVC pipe (for sonde deployment)	1	$258.00	10	$2,580.00		
1" aluminum conduit (for bubbler orifice)	1	$155.00	9	$1,395.00		
2" aluminum pipe (for antennas/raingages)	1	$41.00	9	$369.00		
2" steel pipe (for gage house structure, bank install)	1	$103.00	9	$927.00		
Lock (for gage house, raingage cover)	1	$10.00	10	$100.00		
Misc. tools (handtools, power tools)	1	$1,030.00	2	$2,060.00		
Misc. materials (nuts, bolts, threaded rod, etc.)	1	$412.00	10	$4,120.00		
QW van outfitting (see attached list of equipment	1	$11,330.00	2	$22,660.00		
Vehicle mileage	1	$0.31	5,000	$1,550.00		
SUBTOTAL					$75,622.00	$88,967.06

LABOR

Personnel	**Persons**	**Unit Price**	**Quantity**	**Total**		
Project planning	3	$51.50 (per hour)	16 (hours)	$2,472.00		
Site recon (8 hours/site)	2	$51.50 (per hour)	80 (hours)	$8,240.00		
Preparation time (1 USGS person/4 hours per site)	2	$31.00 (per hour)	40 (hours)	$2,480.00		
Construction time (2 USGS person/3 days each per site)	2	$31.00 (per hour)	240 (hours)	$14,880.00		
Overtime (2 hours/site/person)	2	$31.00 (per hour)	20 (hours)	$1,240.00		
Installation time (1 day/site/person to install instrumentation)	2	$31.00 (per hour)	80 (hours)	$4,960.00		
Database setup (ADAPS, DECODES, web, StormWatch)	1	$51.50 (per hour)	10 (hours)	$515.00		
SUBTOTAL					$34,787.00	$62,119.64
TOTAL (w/o overhead)					$365,976.28	$507,330.46

Installation cost **$507,300.00**

PROJECT: Atlanta Real-Time Hydrologic Monitoring Network
COOPERATOR: City of Atlanta
PURPOSE: To real-time monitor water quality parameters in the metro Atlanta basins
PLAN: Install 2 RT Q sites
REVISED 03-19-02

INSTRUMENTATION

INSTALL 2 REAL-TIME STREAMFLOW SITES

	Part #		Unit Cost	Quantity	SUBTOTAL	TOTAL	TOTAL (w/OH)
Vaisala							
555A DCP	555A	$1,702.59	$1,532.33	3	$4,596.99		
Internal mounting plate	555-7038	$81.37	$73.23	3	$219.70		
GOES radio (100/300 baud)	555-7031	$2,060.00	$1,854.00	3	$5,562.00		
Incremental encoder	436BD-2	$955.84	$860.26	0	$0.00		
Encoder cable	555-3029	$138.02	$124.22	0	$0.00		
Float wheel assembly	436-7001	$264.71	$238.24	0	$0.00		
Antenna	443A	$439.81	$395.83	3	$1,187.49		
Antenna cable	530-3507	$177.16	$159.44	3	$478.33		
VENDOR SUBTOTAL						$12,044.51	$14,170.01
Applied Power							
Solar Panel (20-watt)			$258.00	3	$774.00		
Regulator			$52.00	3	$156.00		
VENDOR SUBTOTAL						$930.00	$1,094.12
Power Sonic							
Battery			$103.00	3	$309.00		
VENDOR SUBTOTAL						$309.00	$363.53
Design Analysis							
Non submersible pressure transducer	H350/355 XL		$3,760.00	3	$11,280.00		
SDI-12 Raingage, 0.01 inch tipping bucket	H340-SDI		$613.00	3	$1,839.00		
VENDOR SUBTOTAL						$13,119.00	$15,434.12
YSI							
Multi-sonde	6820		$3,198.15	0	$0.00		
Field Cable (100')	6093		$185.40	0	$0.00		
SDI-12 flying leads cable	6096		$68.60	0	$0.00		
DO probe	6562		$463.50	0	$0.00		
Turbidity probe	6026		$1,242.18	0	$0.00		
ph probe	6561		$185.40	0	$0.00		
Calibration cable	6067B		$157.59	0	$0.00		
ltiparameter display systems (high memory, barom	650		$2,317.50	0	$0.00		
VENDOR SUBTOTAL						$0.00	$0.00
ISCO							
Automatic Sampler, SDI-12, refrigerated	6712 FR		$5,350.85	0	$0.00		
Stage sensor, to trigger sampler	bubbler		$1,848.85	0	$0.00		
Bottle configuration	1 x 15L		$92.70	0	$0.00		
Suction Line	100 ft		$128.75	0	$0.00		
VENDOR SUBTOTAL						$0.00	$0.00
DELL							
laptop		1	$1,850.00	1	$1,850.00	$1,850.00	$2,176.47
DIAD							
StormWatch licenses (one-time cost for client software)		1	$750.00	2	$1,500.00	$1,500.00	$1,764.71
Instrumentation subtotal							**$35,002.95**

CONSTRUCTION

Materials

Aluminum angle (for gage house structure)	1	$103.00	2	$206.00	
Gage house (DCP and sampler)	1	$4,120.00	0	$0.00	
Gage house (DCP only)	1	$515.00	2	$1,030.00	
Raingage mount (vandal proof)	1	$206.00	2	$412.00	
6" PVC pipe (for sonde deployment)	1	$258.00	0	$0.00	
1" aluminum conduit (for bubbler orifice)	1	$155.00	2	$310.00	
2" aluminum pipe (for antennas/raingages)	1	$41.00	2	$82.00	
2" steel pipe (for gage house structure, bank install)	1	$103.00	2	$206.00	
Lock (for gage house, raingage cover)	1	$10.00	2	$20.00	
Misc. tools (handtools, power tools)	1	$1,030.00	1	$1,030.00	
Misc. materials (nuts, bolts, threaded rod, etc.)	1	$412.00	5	$2,060.00	
Streamgage truck outfitting	1	$11,330.00	1	$11,330.00	
Vehicle mileage	1	$0.31	1,000	$310.00	
SUBTOTAL					$16,996.00

LABOR

Personnel	**Persons**	**Unit Price**	**Quantity**	**Total**		
Project planning	3	$51.50 (per hour)	8 (hours)	$1,236.00		
Site recon (8 hours/site)	2	$51.50 (per hour)	16 (hours)	$1,648.00		
Preparation time (1 USGS person/4 hours per site)	2	$31.00 (per hour)	8 (hours)	$496.00		
Construction time (2 USGS person/3 days each per site)	2	$31.00 (per hour)	48 (hours)	$2,976.00		
Overtime (2 hours/site/person)	2	$31.00 (per hour)	4 (hours)	$248.00		
Installation time (1 day/site/person to install instrumentation)	2	$31.00 (per hour)	16 (hours)	$992.00		
Database setup (ADAPS, DECODES, web, StormWatch)	1	$51.50 (per hour)	2 (hours)	$103.00		
SUBTOTAL					$7,699.00	$13,748.21
TOTAL (w/o overhead)					$54,447.51	$68,746.46

Installation cost **$68,746.46**

PROJECT: Atlanta Real-Time Hydrologic Monitoring Network (revised)
COOPERATOR: City of Atlanta
PURPOSE: To real-time monitor water quality parameters in the metro Atlanta basins
PLAN: Operate 10 real-time SW/QW monitor/auto sampler sites and 2 RT Q sites
REVISED 09-27-01

7-MONTH OPERATION/MAINTENANCE COSTS (6/1/02 - 12/31/02

	% of Year	Unit Price (annual)	Stations	Total
Operate QW stations	58.3	$53,500.00	5	$156,042
	33.3	$53,500.00	5	$89,167
Operate streamflow station	33.3	$10,750.00	2	$7,167

O&M Costs (June 1, 2002 to Dec. 31, 2002) **$252,375**

PROJECT: Atlanta Real-Time Hydrologic Monitoring Network (revised)
COOPERATOR: City of Atlanta
PURPOSE: To real-time monitor water quality parameters in the metro Atlanta basins
PLAN: Operate 10 real-time SW/QW monitor/auto sampler sites and 2 RT Q sites
REVISED 09-27-01

12-MONTH OPERATION/MAINTENANCE COSTS (1/1/03-12/31/03

	% Year	Unit Price (annual)	Stations	Total
Operate QW stations	100.0	$54,600.00	10	$546,000
Operate streamflow station:	100.0	$11,000.00	2	$22,000

O&M Costs (January. 1, 2003 to December 31, 2003) **$568,000**

COA Proposal - Total Project Costs

Year 1 (Mar. 01, 2002 - Dec. 31, 2002)

Item	Sub/Sub Costs	Sub Cost	Total Cost
FULLY INSTRUMENTED SITES			$752,300
Installation		$507,300	
Labor	$62,100		
Equipment	$356,200		
Construction	$89,000		
O & M		$245,000	
Labor 5 sites for 7 months, 5 sites for 4 months)	$245,000		
CONTINUOUS DISCHARGE SITES			$75,900
Installation		$68,700	
Labor	$13,700		
Equipment	$35,000		
Construction	$20,000		
O & M		$7,200	
Labor (2 sites for 4 months)	$7,200		
PERIODIC SAMPLING/HYDRO MEASUREMENTS			$422,230
Labor (7 months)	$8,750	$61,250	
Vehicles/Supplies (7 months)	$3,100	$21,700	
Analytical (representative)		$198,040	
Dissolved Trace Elements ($165)	$23,100		
Suspended Trace Elements ($565)	$79,100		
Dissolved Majors and Nutrients ($155)	$21,700		
Bacteria ($31)	$4,340		
Sewage Tracers ($370)	$51,800		
Quality Control	$18,000		
Analytical (point)		$141,240	
Dissolved Trace Elements ($165)	$23,100		
Suspended Trace Elements ($565)	$79,100		
Dissolved Majors and Nutrients ($155)	$21,700		
Bacteria ($31)	$4,340		
Quality Control	$13,000		
STORM SAMPLING			$146,580
Labor	$4,375	$17,500	
Vehicles/Supplies	$1,550	$6,200	
Analytical (point)		$122,880	
Dissolved Trace Elements ($165)	$9,900		
Suspended Trace Elements ($565)	$33,900		
Dissolved Majors and Nutrients ($155)	$18,600		
Conductivity and pH ($25)	$6,000		
Nutrients ($75)	$0		
SSC ($26)	$4,680		
Bacteria ($31)	$3,720		
Sewage Tracers ($370)	$44,400		
Quality Control	$7,680		

Year 1 (March 01, 2002 - Dec. 31, 2002)

Item	Sub/Sub Costs	Sub Cost	Total Cost
HIGH FLOW SYNOPTIC SAMPLING			$79,140
Labor	$18,500	$18,500	
Vehicles/Supplies	$4,100	$4,100	
Analytical		$56,540	
Dissolved Trace Elements ($165)	$6,600		
Suspended Trace Elements ($565)	$22,600		
Dissolved Majors and Nutrients ($155)	$6,200		
Bacteria ($31)	$1,240		
Sewage Tracers ($370)	$14,800		
Quality Control	$5,100		
TOTAL COSTS - YEAR 1 (Mar. 01, 2002 - Dec. 31, 2002)			**$1,476,150**

Year 2 (Jan. 01, 2003 - Dec. 31, 2003

Item	Object Costs	Sub Cost	Total Cost
FULLY INSTRUMENTED SITES			$546,000
O & M		$546,000	
Labor	$546,000		
CONTINUOUS DISCHARGE SITES			$22,000
O & M		$22,000	
Labor	$22,000		
PERIODIC SAMPLING/HYDRO MEASUREMENTS			$739,820
Labor	$9,010	$108,120	
Vehicles/Supplies	$3,190	$38,280	
Analytical (representative)		$344,740	
Dissolved Trace Elements ($170)	$40,800		
Suspended Trace Elements ($580)	$139,200		
Dissolved Majors and Nutrients ($160)	$38,400		
Bacteria ($32)	$3,840		
Sewage Tracers ($380)	$91,200		
Quality Control	$31,300		
Analytical (point)		$248,680	
Dissolved Trace Elements ($170)	$40,800		
Suspended Trace Elements ($580)	$139,200		
Dissolved Majors and Nutrients ($160)	$38,400		
Bacteria ($32)	$7,680		
Quality Control	$22,600		
STORM SAMPLING			$346.000
Labor	$4,505	$54,060	
Vehicles/Supplies	$1,595	$19,140	
Analytical (point)		$272,800	
Dissolved Trace Elements ($170)	$10,200		
Suspended Trace Elements ($580)	$104,400		
Dissolved Majors and Nutrients ($170)	$30,600		
Conductivity and ph ($26)	$15,600		
Nutrients ($77)	$18,480		
SSC (27)	$11,340		
Bacteria ($32)	$5,760		
Sewage Tracers ($380)	$68,400		
Quality Control	$26,500		
LOW FLOW SYNOPTIC SAMPLING			$74,180
Labor	$11,500	$11,500	
Vehicles/Supplies	$4,100	$4,100	
Analytical		$58,580	
Dissolved Trace Elements ($170)	$6,800		
Bed Sediment Trace Elements ($580)	$23,200		
Dissolved Majors and Nutrients ($170)	$6,800		
Bacteria ($32)	$1,280		
Sewage Tracers ($380)	$15,200		
Quality Control	$5,300		
TOTAL COSTS - YEAR 2 (Jan. 01, 2003 - Dec. 31, 2003)			**$1,728,000**
TOTAL PROJECT COSTS (Mar 1, 2002 - Dec. 31, 2003)			**$3,204,150**

TRANSMITTAL FORM FOR LEGISLATION

TO: MAYOR'S OFFICE

Commissioner's Signature

ATTN: GREGORY PRIDGEON

Director's Signature

Originating Department: Watershed Managment

Contact Person: Felicia Strong-Whitaker,

Committee(s) of Purview: Finance/Executive

Council Deadline: October 4, 2002

Committee Meeting Dates(s): October 16, 2002

Full Council Date: October 21, 2002

CAPTION

AUTHORIZING THE MAYOR OR HIS DESIGNEE TO ENTER INTO AN INTERGOVERNMENTAL AGREEMENT WITH THE U.S. GEOLOGICAL SURVEY, UNITED STATES DEPARTMENT OF THE INTERIOR, IN AN AMOUNT NOT TO EXCEED $2,812,850.00.00, FOR A WATER QUALITY AND WATER QUANTITY LONG-TERM MONITORING NETWORK TO INSTALL WATER MONITORING EQUIPMENT FOR THE DEPARTMENT OF WATERSHED MANAGEMENT. ALL CONTRACTED WORK SHALL BE CHARGED TO AND PAID FROM FUND, ACCOUNT AND CENTER NUMBERS: 2J27 773001 M24I22029999 -$2,332,230.00; 2J27 775001 M24I22029999 - $391,200.00; 2J27 775002 M24I22029999 - $89,420.00

BACKGROUND

FINANCIAL IMPACT (if any)

Mayor's Staff Only

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Received by Mayor's Office: 10/4/02 (date)

Reviewed by: (initials) (date)

Submitted to Council: (date)

Action by Committee: _____Approved _____Advertised _____Held _____Amended

_____Substitute _____Referred _____Other